Jacqueline K. Barton

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Dr. Jacqueline K. Barton is the John G. Kirkwood and Arthur A. Noyes Professor of Chemistry and Norman Davidson Leadership Chair of the Division of Chemistry and Chemical Engineering at the California Institute of Technology. She is a native New Yorker. Barton was awarded the A.B. *summa cum laude* at Barnard College in 1974 and a Ph.D. in Inorganic Chemistry at Columbia University in 1978. After a postdoctoral fellowship at Bell Laboratories and Yale University, she became an assistant professor at Hunter College, City University of New York. In 1983, she returned to Columbia University. In the fall of 1989, she joined the faculty at Caltech. From 1997 to 2016 she held the Arthur and Marion Hanisch Memorial Professorship. In 2009, she began her term as Chair of the Division. Professor Barton has pioneered the application of transition metal complexes to probe recognition and reactions of double helical DNA. Through this research, Barton has trained more than 100 graduate students and postdoctoral students. She has received many awards. These include the NSF Alan T. Waterman Award, the ACS Award in Pure Chemistry, and a MacArthur Foundation Fellowship. She has been elected to the American Academy of Arts and Sciences, the American Philosophical Society, and the National Academy of Sciences, along with an honorary fellowship in the Royal Society of Chemistry. In 2011, Dr. Barton received the 2010 National Medal of Science from President Obama. In 2015, she received the ACS Priestley Medal.

Abstract: DNA-mediated Signaling

Many experiments have now shown that double helical DNA can serve as a conduit for efficient redox chemistry over long molecular distances. This chemistry is exquisitely sensitive to perturbations in the DNA base stack, such as arise with base mismatches, lesions, and protein binding. We have now been exploring how this chemistry may be used within the cell for long range signaling. Increasingly, 4Fe-4S clusters are being found in DNA-binding proteins involved in genome maintenance. These 4Fe-4S clusters, common redox cofactors, are associated not only with repair proteins but also DNA polymerases and primase. Studies are described to characterize DNA–mediated charge transport by these metalloproteins. Experiments indicate that this chemistry is important in the context of oxidative damage and also may provide a first step in how DNA repair proteins may localize in the vicinity of lesions. This redox chemistry at a distance, mediated by the DNA helix, offers a route for long range signaling and coordination of DNA repair and DNA-processing proteins across the genome.